HORNER'S SYNDROME FOLLOWING THYROID SURGERY: A CASE REPORT AND LITERATURE REVIEW

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ABSTRACT

Objective: Horner's syndrome (HS) occurs due to damage to the cervical sympathetic nerve pathway and is considered a rare complication following thyroid surgery with an incidence of approximately 0.2%. This paper reports a case of HS that developed after thyroid surgery and provides a literature review of this rare complication.

Case report: A 29-year-old female patient diagnosed with suspected right thyroid cancer cT3bN0M0 underwent total thyroidectomy and central neck dissection. On the second postoperative day, the patient developed right-sided ptosis and miosis (right pupil 2mm compared to left pupil 4mm). The patient was diagnosed with HS secondary to thyroid surgery. After 3 months of follow-up, the symptoms showed no improvement.

Conclusion: HS following thyroid surgery is a rare complication that may result from various mechanisms such as direct injury to the cervical sympathetic chain, hematoma compression, ischemia, or traction of the cervical sympathetic chain. Standardized surgical procedures and refined surgical techniques are necessary to prevent this complication. Patients should be counseled about the possibility of permanent injury and long-term aesthetic impact.

Keywords: Horner's syndrome; thyroid surgery; complication; ptosis; miosis.

1. INTRODUCTION

Horner's syndrome (HS) was first described in 1853 by Bernard, and later in more detail by Horner in 1869 [1]. This syndrome is characterized by the classic triad of symptoms: ptosis (drooping of the upper eyelid), miosis (pupillary constriction) and anhidrosis (decreased sweating) on the ipsilateral side of the face. HS occurs due to disruption of the cervical sympathetic nerve pathway and is considered a rare complication following thyroid surgery with an incidence of approximately 0.2% [2].

Kaelin and colleagues reported the first case of HS following thyroid surgery in 1915 [3]. In the context of increasing global incidence of thyroid cancer [4], [5] and surgery remaining the primary treatment option, understanding rare complications such as HS is of significant importance.

In this report, we present a case of HS that developed after total thyroidectomy and central neck dissection, while also providing a comprehensive literature review of this rare complication.

2. CASE REPORT

A 29-year-old female patient was admitted to the hospital after incidentally discovering a thyroid

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Date received: 22/3/2025
Date reviewed: 03/4/2025
Date accepted for publication: 10/4/2025

nodule during a routine health check-up. Thyroid ultrasound revealed: a right lobe hypoechoic nodule with irregular margins and calcifications measuring 10×13 mm (TIRADS 5), with evidence of capsular invasion into the strap muscles. No abnormal cervical lymph nodes were detected. The fine-needle aspiration (FNA) biopsy result under ultrasound guidance of the right lobe nodule indicated papillary thyroid carcinoma (category V).

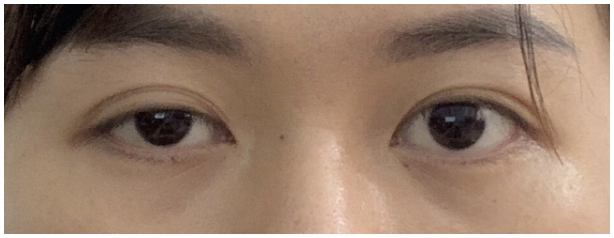

Figure 1a: 2 days after thyroid surgery

Figure 1b: 1 month after thyroid surgery

The patient was diagnosed with right thyroid lobe cancer cT3bN0M0 and underwent total thyroidectomy with central neck dissection, preserving the parathyroid glands and recurrent laryngeal nerves. Intraoperative assessment showed: a firm right lobe tumor approximately 13mm in size with capsular invasion into the strap muscles. Postoperative histopathology results confirmed papillary thyroid carcinoma in the right lobe; 3/3 central neck lymph nodes showed chronic inflammation. Postoperative staging was pT3bN0M0.

On the second postoperative day, the patient developed right-sided ptosis. Physical examination revealed: right ptosis (right upper eyelid covering nearly 4 mm of the corneal limbus) and anisocoria (right pupil 2 mm, left pupil 4 mm). Anhidrosis on the ipsilateral side could not be determined. The patient was diagnosed with Horner's syndrome secondary to thyroid surgery. No other complications such as hypocalcemia or recurrent laryngeal nerve palsy were observed. The patient received conservative treatment and follow-up. After 3 months, the HS symptoms showed no improvement.

3. DISCUSSION

3.1. Epidemiology

HS is rare with an incidence rate of approximately 2.93 per 100,000 people. The 10-year cumulative incidence of HS in adults is reported to be 2.95 per 100,000 adults. This rate is lower in children, at approximately 1.42-2.12 per 100,000 children [6] mainly characterized by symptoms including ptosis, miosis and anhidrosis on the affected face, is a condition that is well documented but rarely reported as a postoperative complication of thyroidectomy, particularly in endoscopic thyroid surgery (ETS. HS can occur at any age and is not dependent on ethnicity. Notably, the incidence of HS following thyroid surgery is only about 0.2-0.3% [2], despite neck surgery, particularly thyroid surgery, being considered a primary cause of HS. This demonstrates that it is truly a rare complication in clinical practice.

3.2. Neuroanatomy and pathophysiology

The ocular sympathetic pathway consists of three neurons [7]. The first neuron (central) originates from the hypothalamus, passes through the brainstem and spinal cord, and synapses with the second neuron in the lower cervical or upper thoracic spinal cord. The second neuron (preganglionic) originates from the spinal nuclei, passes through the upper thoracic cavity, through the inferior and middle cervical ganglia, and synapses with the superior cervical ganglion. The third neuron (postganglionic) originates from the superior cervical ganglion, travels along the carotid arterial system to reach the orbit and eye. Potential causes of HS following thyroid surgery include: postoperative hematoma compressing the cervical sympathetic chain; nerve damage due to ischemia caused by ligation of lateral

branches of the inferior thyroid artery; stretching of the cervical sympathetic chain by surgical instruments; damage to the connecting branches between the cervical sympathetic chain and the recurrent laryngeal nerve; or direct injury to the cervical sympathetic chain [1]. According to Min et al. [6]mainly characterized by symptoms including ptosis, miosis, and anhidrosis on the affected face, is a condition that is well documented but rarely reported as a postoperative complication of thyroidectomy, particularly in endoscopic thyroid surgery (ETS, HS is more common after total thyroidectomy with lymph node dissection, particularly lateral neck dissection. However, HS can also occur after simple thyroid lobectomy or thyroid lobectomy with central cervical lymph node dissection.

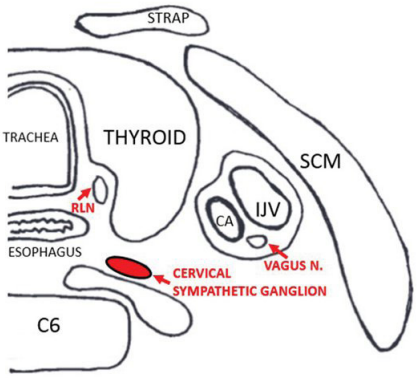

Figure 2: The mechanisms of Horner's syndrome following thyroid surgery

3.3. Clinical features

HS is the result of disruption of the ocular sympathetic pathway, causing three main symptoms. First, ptosis due to paralysis of Müller's muscle, which is innervated by the sympathetic nervous system. Second, miosis due to the loss of pupillary dilation effect of the sympathetic nervous system. Third, facial anhidrosis on the ipsilateral side, a symptom less common than the first two. In our case, the patient presented with the first two symptoms, consistent with other reports in the literature. HS typically manifests within a few hours to 3 days after surgery [6]mainly characterized by symptoms including ptosis, miosis, and anhidrosis on the affected face, is a condition that is well documented but rarely reported as a postoperative complication of thyroidectomy, particularly in endoscopic thyroid surgery (ETS, which is consistent with our case where the patient developed symptoms on the second day after surgery.

3.4. Prognosis and treatment

The prognosis of HS depends on the mechanism of injury. If the injury is related to hematoma, inflammation, or ligation of peripheral branches of the inferior thyroid artery, HS may resolve spontaneously [8]. However, up to 70% of HS cases following thyroid surgery have permanent damage or incomplete recovery, with only 30% experiencing complete recovery but requiring an extended period (from 20 days to 15 months) [1]. This explains why after 3 months of follow-up, our patient still showed no improvement in symptoms. Treatment of HS following thyroid surgery is generally conservative [9] which follows a complex anatomical course through the head and neck. Neck surgery may cause injury to this pathway, causing loss of sympathetic innervation producing the eponymous Horner's syndrome (ipsilateral ptosis, miosis and anhidrosis. Some studies suggest the use of short-term neurotropic therapy such as vitamin

B1 and B12 [6]mainly characterized by symptoms including ptosis, miosis, and anhidrosis on the affected face, is a condition that is well documented but rarely reported as a postoperative complication of thyroidectomy, particularly in endoscopic thyroid surgery (ETS, or short-term oral steroids [10] to stimulate nerve cell repair and reduce symptoms. For persistent HS cases causing aesthetic concerns, apraclonidine eye drops may be used as a short-term option, however, the duration and frequency of use need to be closely monitored due to dose-dependent toxicity [9]which follows a complex anatomical course through the head and neck. Neck surgery may cause injury to this pathway, causing loss of sympathetic innervation producing the eponymous Horner's syndrome (ipsilateral ptosis, miosis and anhidrosis.

3.4. Prevention of complications

To prevent HS following thyroid surgery, thorough preoperative assessment of the characteristics, size, and location of the lesion is essential. Establishing standardized surgical procedures and performing refined surgical techniques to avoid damage to neural structures play an important role. Close postoperative monitoring also helps in early detection of complications and timely intervention. Although HS does not affect visual function, the aesthetic impact can cause anxiety and psychological effects for patients. Therefore, patients need to be thoroughly counseled before surgery about this risk.

4. CONCLUSION

Horner's syndrome following thyroid surgery is a rare complication with an incidence of approximately 0.2%. Our case illustrates this rare complication and emphasizes the importance of early recognition, close monitoring, and comprehensive counseling for patients regarding the possibility of permanent injury and long-term aesthetic impact.

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